
Part IV

ACTIVITIES UNDER THE NATIONAL MITIGATION STRATEGY

"WE WANT TO DEVELOP PRE-DISASTER MITIGATION INCENTIVES AND OPPORTUNITIES, THE INTENT BEING TO HELP PROTECT COMMUNITIES BEFORE DISASTER STRIKES BY PROVIDING ASSISTANCE TO UNDERTAKE A HOST OF MITIGATION ACTIVITIES."

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TESTIMONY BEFORE U.S. CONGRESS
JANUARY 19, 1993

INTRODUCTION

This Part includes brief reports on a wide range of mitigation actions undertaken by FEMA and its federal, State, local, and non-governmental partners. The concepts, opportunities, and programs that are collectively known as "mitigation" are changing to meet growing needs and awareness. This Part reflects activities as of the end of 1995.

The FEMA Mitigation Directorate distributed the *National Mitigation Strategy, Partnerships for Building Safer Communities* (FEMA, 1995) to participants at the first National Mitigation Conference held in Washington, DC. FEMA recognizes that "a significant, sustained, long-term commitment to mitigation as the means for building safer communities requires a national dialog among all levels of government and the private sector that seeks to establish priorities and allocate burdens."

The appropriateness of a national strategy focused on hazard mitigation is supported by the United Nations' designation of the 1990's as the International Decade for Natural Disaster Reduction (IDNDR). The U.N. General Assembly formally launched IDNDR with Resolution 44/236 on December 22, 1989. Recognizing that the goals of IDNDR will have far-reaching worldwide ramifications, the U.S. Congress endorsed the concept by passing a resolution that declared the 1990's to be the "United States Decade for Natural Disaster Reduction."

FEMA has consulted and met with many partners: members and staff of the U.S. Congress; State and local elected officials; emergency and floodplain management, environmental, public works, utility, and planning officials; representatives of the

building, banking, real estate, and insurance industries; academicians at public and private colleges and universities; volunteer organizations and public interest groups; and private citizens. The coordination effort included distributing over 15,000 questionnaires and conducting public Mitigation Forums in 11 communities across the United States during the spring of 1995.

FEMA has articulated national mitigation goals: to substantially increase public awareness of natural hazard risk so that the public demands safer communities in which to live and work; and to significantly reduce the risk of loss of life, injuries, economic costs, and destruction of natural and cultural resources that result from natural hazards. Five major elements have been identified:

- Hazard Identification and Risk Assessment (Chapter 26);
- Applied Research and Technology Transfer (Chapter 27);
- Public Awareness, Training, and Education (Chapter 28);
- Incentives and Resources (Chapter 29); and
- Leadership and Coordination (Chapter 30).

CHAPTER

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HAZARD IDENTIFICATION AND RISK ASSESSMENT

Hazard identification and risk assessment together form important elements of any mitigation initiative. They establish both a starting point and the boundaries upon which mitigation plans and alternatives will be based. FEMA and others devote significant resources to hazard identification and risk assessment.

Examples of FEMA's hazard identification and risk assessment activities include identification and mapping of flood hazard areas under the NFIP, development of storm surge and wind-decay models to characterize the effects of hurricanes, preparation of maps depicting earthquake hazard zones, and maintenance of the National Inventory of Dams.

Activities undertaken by FEMA as of the end of 1995 include:

- Preparation of *Multi-Hazard Identification and Risk Assessment* to establish a summary baseline of information on hazard identification and risk assessment;
- Cooperation with the National Institute of Building Sciences to develop and test a nationally applicable, standardized methodology for estimating potential losses from earthquakes;
- Creation and distribution of NFIP maps in digital format for hundreds of counties;
- Performance of a shoreline mapping study in cooperation with NOAA's National Ocean Service and the Massachusetts Coastal Zone Management Office, to include assessment of photogrammetric and Global Positioning System-based technologies to identify coastal high hazard areas;
- Initiation of numerous coastal erosion mapping studies in conjunction with State Coastal Zone Management programs, in response to the National Flood Insurance Reform Act of 1994 (NFIRA);
- Initiation of a study to determine the technical feasibility of mapping riverine erosion hazard areas, in response to NFIRA;
- Preparation, in cooperation with NWS and USACE, of hurricane evacuation studies for New Jersey, New York, and Connecticut, including a regional transportation analysis for the New York metropolitan area;
- Participation in a Federal-State working group formed to develop a statewide risk assessment for flood-related hazards in Illinois;

- Initiation of a seismic mapping project with the California Division of Mines and Geology to ensure land-use planning and seismic building measures are applied in affected areas of Los Angeles, Ventura, and Orange Counties; and
- Performance of a risk analysis of U.S. pipelines to identify areas that have high exposure to natural hazards and to assess the impact of pipeline rupture on people, commerce, and the environment.

CHAPTER

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APPLIED RESEARCH AND TECHNOLOGY TRANSFER

CHAPTER SUMMARY

Many techniques and tools for hazard identification, risk assessment, and mitigation have been developed through the application of research and technology. FEMA has participated in the development of many, including land-use planning, land-use management, engineering design, and building standards, codes, and practices.

In recent years, FEMA has placed greater emphasis on coordination and priority-setting for the development and implementation of mitigation tools and techniques, and the sharing of knowledge gained through applied research and the use of technology.

Problems associated with hazard identification, risk assessment, and developing mitigation solutions are inherently spatial in nature. New and emerging technologies make it feasible to automate labor-intensive tasks and to change dramatically the way emergency management is conducted.

The conceptual and theoretical roots of spatial information science's analytical methods are in the geographic and cartographic disciplines. The tools are found in the high technology areas of computer science, computer mapping, remote sensing, database management, systems modeling, and digital telecommunications. When these elements are combined and managed, the power of the modern computing system is extended beyond that of the traditional management information system. The result is a system that can handle all of the tasks normally accomplished by traditional emergency management systems, and that also answers "where?" questions, such as:

- Where did events happen?
- Where else can they happen?
- Where are the highest priority areas?
- Where is the situation changing?
- Where are the risks?
- Where are mitigation measures needed?
- Where are exposed populations?
- Where are evacuation routes and destinations?

Important emerging technologies include:

- **Geographic Information System (GIS)** technology, which allows users to collect, display, manage, and analyze large volumes of spatially referenced and associated attribute data to solve complex research, planning, and management problems;
- **Remote-sensing applications** designed to collect information about a target from either airborne or spaceborne sensors without physical contact between the data-gathering device and the target;
- **Computer models** developed by FEMA and others;
- **Databases and indices** prepared by FEMA and others that can be used for hazard identification and risk assessment; and
- **Digital communication technologies** for collectively sharing data resources, assuring the integrity of updates, and cooperative processing among responding Federal, State, and local agencies and the private sector.

GEOGRAPHIC INFORMATION SYSTEMS

GIS provides the integration vehicle for mapping, modeling, database management, and information analysis including topography, natural and cultural resources, land use and cover, infrastructure, and building types and densities.

Too often, GIS is viewed simply as a technology for map production. Implementation based on this objective results in separation of data and decision-making from spatial analysis resources. GIS also may be viewed simply from the perspective of hardware and software design. Such viewpoints result in highly capable systems that are rendered essentially ineffective through inattention to the acquisition and structuring of data for rapid retrieval and analysis.

GIS is designed to allow users to collect, manage, and analyze large volumes of spatially referenced and associated attribute data. GIS is used to solve complex research, planning, and management problems. The major components of systems are a user interface, system/database management capabilities, database creation/data entry capacity, spatial data manipulation and analysis packages, and display/product generation functions.

Spatial data used in GIS consist of the various features that are defined by geographic location and descriptive attributes. Features can have point, line, or areal characteristics that are visually discernible, such as building locations, roads, and water bodies, or invisible boundaries such as county boundaries, land-use zones, and school districts.

Geographic information systems typically are designed to handle either raster or vector data structures. However, this is changing rapidly, and increasingly capable products are developed to integrate raster-image data with vector information. Image processing systems, specifically those developed to manipulate remotely-sensed digital data from satellites (such as LANDSAT or SPOT) have many functions that are synonymous with a raster-based GIS.

Most Federal agencies have significant GIS efforts underway. Federal expenditures for hardware, software, and data are running into the hundreds of millions each year. To establish standards and coordinate efforts, the Federal Geographic Data Committee (FGDC) developed the Spatial Data Transfer Specification (SDTS) as a Federal Information Processing Standard (FIPS). The GIS Standards Laboratory of the National Institute for Standards and Technology (NIST) has primary responsibility for

maintenance of the SDTS standard in close coordination with FEMA, USGS, and others.

A major focus of FEMA's GIS development efforts is situation assessment. The purpose of situation assessment is to provide timely and accurate information to decision makers in advance of, and in response to, natural disasters and catastrophic events. Performing a situation assessment requires identification of hazards (areal extent, magnitude, and frequency), as well as information about exposed populations, infrastructure, and property at risk. These data, when combined with damage prediction models, offer the means to estimate rapidly the type and scale of response needed. Aerial and ground assessment data, which become available as an event progresses, serve to ground-truth and refine damage models and to develop the planning database for comprehensive recovery operations and mitigation initiatives.

Data collected by FEMA as part of situation assessment efforts include:

- Baseline data to document pre-event geography, demographics, and economics;
- Risk data from scientific and technical studies conducted for hazard identification and risk assessment;
- Policy data on insurance coverage and exposure;
- Event data to document the type, nature, physical forces, and extent;
- Aerial assessment data to document the extent of the damage area and the intensity of damage using airborne reconnaissance resources; and
- Ground assessment data to provide information on a structure-by-structure basis about the magnitude of damage, including information on damage not evident from airborne reconnaissance.

GIS is a critical technology element for situation assessment. It facilitates management of spatial data, the analysis of geographic trends, statistics, and relationships, and the development of mapping products. However, GIS is most effective when operating in a network environment and supported by robust database management systems.

In the event of a reasonably predictable disaster, such as a hurricane or large riverine flood, initial situation assessments on a county level may be required several days prior to the expected event. Within hours of the event, as storm tracks and/or inundation patterns become increasingly predictable, detailed data may

required. Immediately after passage of the storm or flood peak, detailed statistics are required for situation assessment. Air and ground assessments, combined with local government and utility data files, provide the information that can take the level of detail to the individual structure.

Through GIS analysis of U.S. Census factors such as age, ethnic group, and income, neighborhoods likely to require special attention can be identified. State and Federal agencies can use these data to direct priority specialized resources toward high concentrations of elderly, non-English speaking, and low-income areas.

FEMA and others have applied GIS technology in several program areas:

- Hundreds of NFIP maps have been converted or prepared in digital format.
- FEMA implemented the Emergency Support Team (EST) GIS as a result of the 1993 Midwest floods. The EST-GIS uses a large data store (24 GB), holding TIGER-class base maps and U.S. Census databases. Other point data are on-line, such as the National Inventory of Dams, USEPA Toxic Release Inventory, and Superfund site locations. The system is capable of producing ad hoc database analysis and mapping in direct support of needs in the post-disaster environment.
- FEMA and the U.S. Department of Transportation developed GIS database files on liquid and natural gas pipelines as part of a nationwide risk analysis of the impact of natural hazards on pipelines with high exposures. The site-specific geographic, demographic, climatic, infrastructure, and economic data are used to develop detailed scenarios for hypothetical pipe ruptures in 10 high exposure/high consequence areas.
- FEMA developed a GIS-driven database for repetitively flood damaged sites in North Dakota and South Dakota. The database will be used for short- and long-term planning by all governmental and planning agencies.

REMOTE-SENSING APPLICATIONS

Remote-sensing may be defined as the collection of information about a target without physical contact between the data-gathering device and the target. Remote-sensing devices range from the simple, such as cameras, to the exceedingly complex, such as microwave systems based on satellite platforms.

Data collected by remote-sensing devices are typically either analog (such as a standard film recording) or digital. Analog data, including aerial photographs, offer simplicity for processing and interpretation. Digital recordings require more complex systems to collect and analyze the data. However, digital remote-sensing products are compatible with GIS technology.

Emergency managers and hazard specialists often use products generated by remote-sensing techniques to provide information on the location, severity, and extent of damage following a natural disaster. Remote-sensing offers a quick, low-cost means of collecting information. Applications are optimized when developed to support GIS analysis capabilities.

The primary remote-sensing systems available to support disaster response, recovery, and hazard mitigation efforts are either airborne (helicopter, airplane, and remote-piloted vehicle) or spaceborne (orbiting and geosynchronous satellites). Airborne sensors are categorized by image or data collection technology and separated into eight categories: electro-optical, infrared, radar, video, multispectral, Light Detection and Ranging (LIDAR), acoustic, and magnetic.

Many airborne sensors have excellent, long-term potential to support mitigation activities. Global Positioning System (GPS) receivers integrated with existing video or digital cameras can be used efficiently to count and identify structures, to detect change, and to delineate areal boundaries. GPS-augmented video is particularly inexpensive and can provide excellent relative horizontal location accuracies. It is especially advantageous for "ground-swath" or narrow-path data collection. Mature technologies exist for using this type of remote sensing for direct input into GIS environments and map update files. Video imagery can be used for three-dimensional viewing and medium-accuracy mensuration.

Airborne, high-resolution, multispectral imagery combined with "subpixel" analysis processing can offer input for change detection and precise mapping. The Interferometric Synthetic Aperture Radar (IFSAR) and LIDAR systems that are under development may provide opportunities for rapid collection of accurate elevation data. The post-processing of images must mature before either system will be widely operational. They depend on very disciplined calibration and correct processing of the associated GPS, inertial navigational data, and the airborne vehicle's attitude control information to derive relative vertical accuracies.

Spaceborne sensors are imaging and monitoring systems that are separated into categories: electro-optical; infrared; radar; multispectral; advanced very high resolution radiometric; and others, such as special purpose environmental sensing systems. Current estimates are for 60 additional spaceborne remote-sensing systems to be available by the year 2010.

SPOT and LANDSAT satellite imaging sensors have been used for many years, as have digital processing techniques needed to take full advantage of the imagery. SPOT panchromatic can be used for map scales of 1:24,000 for feature mapping. Elevation determination can be performed with Stereo-SPOT.

LANDSAT images are useful for area delineation, natural feature classification, and interpretation where features more than 30 meters in size are of interest. The emerging Canadian-launched RADARSAT, may be very beneficial for monitoring large features, such as a volcano soon after an eruption. A useful technology for monitoring an entire mountain area and measuring such factors as earth deformations is stereo Synthetic Aperture Radar (SAR) imagery. SAR penetrates atmospheric vapor and gives excellent nighttime and daytime imagery for measuring in all dimensions, analyzing data and providing image scenes that may support warnings about follow-on eruptions.

The two satellite remote-sensing systems that offer the most potential for hazard identification and risk assessment are: the existing, mature, classified electro-optical National Technical Means (NTM) sensor system, which was used during the Gulf War; and the emerging commercial electro-optical systems that are expected to be available by 1998. The NTM system will have advantages: a mature collection process; public domain processing tools; the ability to use higher resolution imagery; output that may be used as unclassified data; Digital Elevation Model (DEM) production satisfying FEMA requirements; fine-scale capabilities; narrow-swath and wide-area coverage; and predictable imagery acquisition costs. Emerging commercial satellite systems also have advantages, including their similarities to NTM imagery, their use in combination with other commercial remote-sensing systems, and their lower per square mile costs than airborne photography for many applications, especially digital orthophoto production.

Satellite-borne electro-optical sensors can be very helpful to precisely match geographic location coordinates of structures to local GIS data records or U.S. Census Bureau data, where available. This would facilitate local government participation in checking for at-risk structures.

FEMA, USACE, USGS, and the National Aeronautic and Space Administration (NASA) have undertaken a cooperative interagency assessment of methods to produce remotely-sensed, highly accurate digital elevation data. These data have the potential to reduce the cost of identifying flood hazard, storm surge, and dam break inundation areas, and for performing risk assessments of those areas.

COMPUTER MODELS

FEMA's modeling resources have been applied to estimating expected damage from catastrophic hurricane, flood, and earthquake events. Efforts are underway to develop systems of models to address comprehensively damage assessment estimation needs. Other Federal agencies have been active in developing models.

Some of the models in use by FEMA and others are summarized below.

- The Automatic Lightning Detection System (ALDS) links an electronic detection device to a network of remote automated weather stations. Using computers, ALDS locates lightning strikes and predicts the probability of starting wildfires.
- The Federal Emergency Management Information System (FEMIS) was developed by Pacific Northwest Laboratories for FEMA and the U.S. Army initially for use in the Chemical Stockpile Emergency Preparedness Program. FEMIS is an automated decision-support system that integrates all phases of emergency management. Plans can be created under non-emergency conditions and executed during an actual emergency response. Emergency managers may use FEMIS to develop plans, respond to an emergency, conduct re-entry and recovery operations, and execute mitigation tasks.
- TTSURGE and FEMA SURGE are two-dimensional hydrodynamic models used to prepare the detailed hydraulic analyses of the relationship of tropical cyclone storm surge elevations, astronomical tides, shoreline configurations, and elevations through the generation of synthetic populations of storm data.
- The Sea Lake and Overland Surges from Hurricanes (SLOSH) model, a two-dimensional hydrodynamic model that predicts coastal and inland storm surge flooding potential at various time intervals, is used by the National Hurricane Center to help FEMA and USACE develop specific evacuation plans for urban centers along the Atlantic and Gulf Coasts.

- The Automated Coastal Engineering Software packages, developed by USACE, include coastal erosion models and wave runup models for coastal engineering applications.
- TSU2, a tsunami wave runup model developed by USACE, is used to determine the inundation limits of the 100-year tsunami wave based on incoming wave heights, beach and shoreline slope, and wave energy losses due to ground cover and friction coefficients.
- The Geophysical Fluid Dynamics Laboratory tropical cyclone forecasting models are used by the National Hurricane Center to predict and forecast the movement and intensity of hurricanes in the North Atlantic basin.
- HURISK, a model developed by the Science Applications International Corporation, analyzes tropical storm and hurricane behavior and risk for site-specific reaches of the Atlantic coastline.
- The SBEACH model developed by CERC is an empirically based, two-dimensional model used to predict storm-induced beach erosion and post-storm recovery.
- The Norwegian Geotechnical Institute's Statistical Avalanche Runout Model is used to predict avalanche runout zones using statistical procedures (multiple regression equations) and historical data on known avalanche paths and runout distances.
- The PCM Avalanche Dynamics Model, Swiss Avalanche-Dynamics Model, and a particle simulation model of avalanche motion are used to compute velocity, acceleration, runout distance, flow depth, deposit depth, and other flow characteristics along the avalanche path profile.
- The National Severe Storms Forecast Center, Severe Local Storms Unit's Tornado and Severe Thunderstorm Forecast Program is used to identify areas of severe weather and to issue watches to affected regional centers.

DATABASES AND INDICES

Extensive databases and indices prepared by FEMA and others can be used for hazard identification and risk assessment. Some of the better known and more widely used are summarized below.

- The ERMS database, derived from Federal civilian agencies to assess effects of a nuclear blast/radiation, is extractable by FIPS code and includes data orga-

nized into six groups: communications, economic affairs, energy, government, human services, and law-legal.

- The Oak Ridge Laboratory's Vulnerability Index is a geocoded coastal database capable of integration into existing GISs. The database includes variables for each coastal segment for seven physical land factors, seven marine factors, and six climatological factors.
- The Coastal Erosion Information System (CEIS) was created from data collected by Dr. Robert Dolan and others, and is maintained as a computerized database accessible through the University of Virginia. CEIS has shoreline rates of change and average annual erosion rates for various geographic regions of the United States, based on erosion data computed at 50-m (165-ft) intervals along the shoreline.
- The Dolan/Davis Nor'easter Scale rates extratropical cyclones and severe winterstorm intensity based on a "storm power index," with power defined as the maximum deep-water significant wave height squared, times the storm duration. The classification system was developed from measured storm data updated through 1992: storm locations, track directions, event durations, wave fetch lengths, and offshore wave heights.

DIGITAL COMMUNICATIONS TECHNOLOGIES

Many databases collected for analysis in spatial information systems are exceedingly large. Total databases required for managing a disaster over a county-wide area may be several billion bytes, or gigabytes, in size. Robust communication ability is required for collectively sharing data resources, assuring the integrity of updates, and cooperative processing among responding Federal, State, and local agencies and private companies and individuals.

In addition to the requirement to move large volumes of data rapidly, data compression tools and smart database management practices are required. Brute force transmission of massive databases should be performed when only necessary.

The digital telecommunications system is the backbone that enables distributed database management, client-server system architectures, and transactional processing. These are key technologies in enhancing the future operational performance of emergency managers.

With advances in telecommunications occurring almost daily, the ability of emergency management specialists, government officials, and even individuals, to share

vital disaster and hazard information is enhanced. Some recent systems and services that will increase the likelihood that the technology-sharing objectives will be met are summarized below.

- The Internet, with 30,000 networks in 86 countries, is the best known and most widely used computer-mediated networking system. Although technical problems occasionally limit access, in the emergency management environment the Internet can be a valuable asset. It can provide a powerful platform for coordinating and integrating information processing activities between individuals, communities, States, and nations, as well as between the various professional disciplines and their highly functional associations.
- The World Wide Web is a global, multi-media information service accessible through the Internet to provide information about Federal agencies, as well as commercial, educational, and other governmental organizations. FEMA has made assorted natural hazard and mitigation information available on the World Wide Web and its associated Gopher service. Other Web sites that are of interest to hazard identification and mitigation specialists include: the National Hazards Research and Applications Information Center Home Page; Hazard Net, a demonstration project of the U.N. International Decade for Natural Disaster Reduction; National Geophysical Data Center Natural Hazards Data Page; USGS Home Page; National Hurricane Center Home Page; the Cascade Volcanoes Observatory Page; and many others.
- EPIX integrates a variety of services that were developed separately for the Internet into a single network for disaster- and mitigation-related information. EPIX has assembled a number of directories, databases, and tools concerning disaster-related topics and grouped them into an "encyclopedia" of resources for emergency managers.
- E-Mail was developed as an early electronic processing service. It is a primary vehicle for distributing documents and information about natural hazards, including information on research and emergency management activities. Some well-known e-mail subscription services include:
 - *Disaster Research*, an electronic newsletter maintained by the Natural Hazards Research and Applications Information Center, Boulder, CO, provides information about recent disaster events, current research projects, legislation, and new developments;
 - *Networks in Emergency Management* provides communications-related information;
 - *Local Emergency Planning Committee* distributes information on hazardous materials topics; and
 - *FireNet* provides information on wildland fires.
- FEMA FAX is a 24-hour fax-on-demand service with a voice mail menu. Much of FEMA's information made available through the Internet on the World Wide Web is also available through FEMA FAX. Information is available in several categories, including:
 - *Disaster Information* contains the latest information on current and open disaster activities nationwide, including a list of contacts at the various Disaster Field Offices, historical disaster profiles, and annual disaster activity reports.
 - *Emergency Preparedness Information* contains background information and fact sheets on what to do before, during, and after a disaster, as well as a list of available publications.
 - *Miscellaneous Issues, Topics, and Policy Information* contains policy papers, white papers, and other documents on topics related to FEMA and FEMA's mission, including relevant documents on hazard identification, risk assessment, and mitigation.

CHAPTER

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PUBLIC AWARENESS,
TRAINING,
AND
EDUCATION

CHAPTER SUMMARY

FEMA works with other Federal agencies, State and local emergency managers, and professional associations to develop and implement public awareness, training, and education programs. These programs are designed to enhance awareness of natural and technological hazards and available mitigation solutions and alternatives. Individuals and organizations must be aware of the existence of a hazard and the risk posed by that hazard before they can make reasoned judgments for response and mitigation.

FEMA operates the Emergency Management Institute (EMI) in Emmitsburg, MD, which offers curricula on earthquake and flood hazards, mitigation, geographic information systems, and risk reduction techniques. FEMA training and public awareness activities also take place within the different geographic regions exposed to unique or multiple hazards. Many successful State and community training and education activities have been conducted to complement Federal programs.

RECENT FEDERAL TRAINING AND EDUCATION ACTIVITIES (1995)

As of the end of 1995, courses at EMI included:

- *Building for the Earthquake of Tomorrow: Complying With Executive Order 12699*, a non-technical discussion of earthquakes, seismic building design, and the requirements of the Executive Order, designed for local community officials;
- *Retrofitting Floodprone Residential Buildings*, a 4-1/2-day course on retrofitting techniques, designed for engineers, architects, and local community officials;
- *School Earthquake Safety Program Workshop*, a 4-1/2-day workshop covering such topics as hazard identification, nonstructural hazard mitigation, earthquake drills, post-disaster mitigation opportunities, and planning, designed for school administrators, PTA members, district facility managers, and local emergency managers;
- *Teacher Enhancement Workshop on Earthquakes*, a 4-1/2-day workshop providing a hands-on demonstration of classroom activities using the National Science Teacher Association's "EARTHQUAKES—A Teacher's Package for K-6," designed for elementary school teachers;
- *Seismic Sleuths Leadership Institute for Masters Teachers*, a 4-1/2-day program designed to introduce an interdisciplinary package on earthquakes to show how mathematics, social studies, and science can be applied to reduce seismic hazards;
- *Geographic Information System Training*, a course providing information on FEMA's Digital Flood Insurance Rate Maps, designed for State and local officials, other Federal agencies, and the American Red Cross;
- *Multi-Hazard Safety Program for Schools*, a 4-1/2-day program covering such topics as risk reduction techniques, post-disaster recovery and mitigation opportunities, and crisis counseling, designed for school board members, school administrators, safety coordinators, teachers, and PTA members; and
- *Multi-Hazard Building Design Summer Institute*, a summer-long program covering wind, flood, and earthquake mitigation design, designed to provide instructional materials for engineering and architecture professors;

Recent training activities that FEMA has participated in or conducted include:

- A workshop to present HAZUS, the earthquake loss estimation methodology (Chapter 24) and related software, and to solicit input on its applicability and ease of use;
- The first "pilot test" of the Earthquake Loss Estimation Methodology in Portland, OR, in cooperation with the Oregon Department of Geology and Mining Industries and the Portland METRO government;
- A technical seminar on seepage and piping of dams, conducted with the Interagency Committee on Dam Safety and attended by more than 100 Federal engineers;
- A training course on the development and implementation of Emergency Action Plans for dams, conducted in Denver, CO and Panama City, FL, for dam safety and emergency management officials, developed with FERC and the Association of State Dam Safety Officials;
- The final modules for Training Aids for Dam Safety, including *Dam Safety Process*, *Dam Safety Awareness*, and *Facilitator's Guide for Group Training*;
- A coastal hazard mitigation conference in Charleston, SC, co-sponsored with NOAA;
- Training programs in multi-hazard resistant construction for architects, in cooperation with the American Institute for Architects (AIA);
- Support for AIA's development of seismic-resistant construction workshops to promote mitigation at the local level;
- Technical support and guidance to three national model building code groups for their wind- and flood-resistant construction workshops;
- A home study version of the course *Building for the Earthquake of Tomorrow*, to be offered through the EMI Home Study Program;
- Training sessions on the economics of hazard mitigation for disaster response and recovery staff from State and Federal agencies;
- A pilot workshop on the implications of an earthquake in rural areas, held in Asheville, NC;

- A 1-day course entitled *Seismic Retrofit Training for Building Contractors and Inspectors* following the 1994 Northridge Earthquake, in cooperation with the California Office of Emergency Services and the Building Industry Association;
- The *Mitigation Operations Manual*, delivered at training sessions for FEMA reservist employees and others;
- A cooperative agreement with the International City/County Management Association to conduct a needs assessment and to develop materials for educating city and county administrators on benefits and implementation of mitigation alternatives at local level;
- A 1-day workshop, *Finding the Weak Links: Cascadia*, co-sponsored with the USGS and the Washington Department of Natural Resources as part of an effort to address earthquake hazards in the Puget Sound region;
- An annual series of educational teleconferences for fire service and emergency management audiences throughout the United States on subjects ranging from flammable gases and liquids to residential sprinklers; and
- A continuing series of educational programs at the National Fire Academy and EMI in Emmitsburg, MD.
- The New Hampshire Office of Emergency Management used radio and television announcements to increase public awareness of natural and technological hazards and to stimulate preparedness measures in communities, households, schools, civic groups, and businesses. The activities were funded in part by the Federal earthquake and hurricane programs, and additional funding was provided by the New Hampshire Association of Broadcasters.
- The Massachusetts Department of Environmental Management is developing a workbook to guide Massachusetts communities through the hazard mitigation planning process.
- State officials of New Hampshire and Rhode Island are updating Floodplain Management Handbooks to provide guidance to communities on the most current information on flood hazard mitigation.
- The Colorado Office of Emergency Management, in cooperation with the Center for Community Development and Design at the University of Colorado-Colorado Springs, developed a training program in floodproofing techniques. Students who received the training assisted homeowners threatened by rising floodwaters.
- Using a grant from FEMA, the State of California is developing seminars to encourage local government and industry leaders to adopt and enforce codes to deal with urban-wildland fire problems. Planned seminars topics include: wildland fuels and fire behavior; fuels management; defensible space; fire-fighting infrastructure; slope stabilization; codes, standards, and regulations; and coordinated planning, code adoption, and enforcement.

RECENT NON-FEDERAL TRAINING AND EDUCATION ACTIVITIES (1995)

The resources and expertise available for directing research and implementing mitigation programs and activities vary considerably from State to State. Some States have had difficulty keeping emergency management high on the priority list of citizens, legislatures, and governors. State emergency management agencies coordinate Federal funds with State funds to accomplish their goals.

Some recent success stories in particular States and communities are summarized below.

- The New England States Emergency Consortium, the first multi-state emergency management organization in the United States, initiated the *Mitigation Makes Sense* project in cooperation with the Aubuchon Hardware Store chain. The project produced a "how-to" video guide providing homeowners with information for mitigating natural hazard risks.
- FEMA worked with Federal and New York State agencies in a cooperative project known as the *Metropolitan New York Hurricane Transportation Study*. The results, which will be shared with other States, underscore the need for preparedness and mitigation, including, at a minimum, anticipating which public facilities must be closed during a hurricane,

and developing a plan to allow for commuter and traditional evacuee movements.

- Under a partnership with FEMA, AIA provided training to the faculty of schools of architecture and to practicing architects on seismic and multi-hazard design, construction, and land use.
- Hazard mitigation education programs, funded by FEMA and other sponsoring Federal and State agencies, are being developed and implemented by the Natural Hazards Research and Applications Information Center, Earthquake Engineering Research Institute, National Center for Earthquake Engineering Research, Southern California Earthquake Center, and New Mexico Bureau of Mines and Mineral Resources, among others.

RECENT FEDERAL PUBLIC AWARENESS ACTIVITIES (1995)

During the early part of the 1990s, FEMA implemented many activities to make the general public more aware of hazards and how their effects can be mitigated. Some recent activities undertaken by FEMA are summarized below.

- FEMA's Associate Director for Mitigation appeared on television programs with Congressman Johnson of Texas and Congressmen Farr and Mineta of California; was a speaker on two panels at the 1995 Natural Hazards Conference in Boulder, CO; and was a speaker at a workshop during the National Conference of State Legislatures Annual Meeting (1995) in Milwaukee, WI.
- FEMA's Deputy Associate Director for Mitigation addressed a 3-day meeting of academicians and officials from the United States, Canada, and Mexico at the Workshop on Natural Hazards Risk Assessment held in Ontario, Canada.
- Using information gained from the damage inflicted by Hurricane Andrew, FEMA teamed with the American Red Cross, National Association of Home Builders, Georgia Emergency Management Agency, and the Home Depot Corporation to produce an information package entitled *Against the Wind*. The package, consisting of a 18-minute video and an 8-page brochure, provides information to help homeowners mitigate the effects of hurricane-related wind damage.
- Representatives of FEMA participated with the USACE and Congressman Horn of California in a discussion forum on Flood Restoration (AR) Zones, attended by homeowners, builders, government officials, environmental groups, and other interested groups.
- The FEMA staff assigned to the State Support Services Element of the Community Assistance Program worked with the 44 participating States, Puerto Rico, and the U.S. Virgin Islands to publish an assortment of public awareness documents concerning flood hazard reduction and floodplain management, including manuals for State and local officials, professional newsletters, and brochures for the general public.
- FEMA published and distributed a new publication, *Engineering Principles and Practices for Retrofitting Flood Prone Residential Buildings*. Prepared with contributions from floodproofing experts nationwide, it provides guidance to engineers, architects, and building officials on how to select the most cost-effective method of nonstructural flood protection for existing buildings. FEMA's cost-effectiveness software program for riverine and coastal A-zone floodplains is distributed with the publication.
- FEMA developed an Emergency Education Network production, *The Status of Dam Safety in the United States—The 1994 Georgia Floods*, which aired on August 31, 1994.
- FEMA representatives participated in the Steel Buildings Project User's Workshop in Los Angeles, CA, which was attended by the professional community that has been involved in the rehabilitation and repair of steel buildings damaged during the Northridge Earthquake.
- FEMA developed and distributed a publication entitled *Mitigation Standards for Reconstructing or Retrofitting Non-Regulated Public Dams in the State of Georgia*.
- Under the Regional Education Outreach Initiative, representatives of FEMA Region I and State agencies visited Grade 1-5 classrooms. Through an interactive program, students discussed family emergency preparedness, developed a family disaster plan and supplies kit, and learned about the role of emergency management in daily life. The program involved more than 7,000 students and teachers.
- FEMA Regional Office staff in Atlanta, GA, initiated work on a video and reference booklet covering hurricane mitigation for hospital administrators, and distributed more than 1,000 hurricane-related videos to State and local officials, including *Against the Wind*,

Hurricane: Prepare to Survive, and *Jason and Robin's Awesome Hurricane Adventure*.

- FEMA representatives participated in the National Flood Insurance Forum in Fargo, ND. As a result, the Regional Office in Denver, CO, has seen an increase in the number of requests for information on flood insurance and mitigation measures.
- FEMA Regional Office staff in Denver developed and distributed a video documenting the multi-objective flood hazard mitigation plan process as implemented in Vermillion, SD.
- FEMA distributed, with the help of Home Depot and Georgia Pacific, informational materials on hurricanes to residents of Atlanta and Florida.
- FEMA produced numerous earthquake-related documents for the public, including: *Earthquake Preparedness: What Every Childcare Provider Should Know*; *Identification and Reduction of Nonstructural Earthquake Hazards in Schools*; and *Seismic Retrofit Incentive Programs: A Handbook for Local Governments*.
- FEMA produced and distributed a poster for Grades K through 6 entitled *Earthquake Safety*.

RECENT NON-FEDERAL PUBLIC AWARENESS ACTIVITIES (1995)

Recent hazard-related public awareness activities undertaken by State and local government agencies, colleges and universities, and private-sector organizations are summarized below.

- The California State Senate generated numerous documents pertaining to natural hazards, including *Official Report of the Northridge Earthquake Task Force and School Site Preparedness for the Safety of California's Children K-12—Official Report of the Northridge Earthquake*.
- The State of Maryland developed a hurricane brochure for publication in *The Baltimore Sun*. The brochure highlighted property protection projects selected from the FEMA's video *Against the Wind*.
- The Virginia Department of Emergency Services developed a newspaper supplement, distributed during Hurricane Awareness Week, that included reprints from *Against the Wind* and provided specific protection recommendations for homeowners. VDES co-sponsored an all-day hurricane awareness exhibition at a regional mall and the construction of "The Hurricane House," built by vocational school students with advice and guidance from emergency management staff to demonstrate techniques for strengthening structures.
- The State of Delaware reprinted and distributed 30,000 hurricane preparedness and evacuation brochures as part of its public awareness program.
- The Connecticut NFIP State Coordinator's office developed and distributed *The Torrent*, a floodplain management newsletter for local officials and interested citizens, covering important NFIP and hazard mitigation issues.
- The Ohio Department of Natural Resources updated its floodplain management handbook to include information on mitigation and Federal agencies that provide mitigation assistance.
- The Indiana Department of Natural Resources is producing a video focusing on the relocation of a community in southern Indiana that was devastated by flooding.
- The Wisconsin Department of Natural Resources developed a mitigation planning document to assist local officials and planners in developing local mitigation plans and programs.
- The American Red Cross prepared, and continues to distribute videos, brochures, and coloring books designed to make the public more aware of the need to be prepared for and to mitigate the effects of disasters, including:
 - *Preparing Your Home for a Hurricane*, a 44-page booklet for homeowners in hurricane-prone areas;
 - *Before the Wind Blows*, a package that includes a 12-minute video and a 34-page booklet designed for areas where hurricane evacuations are likely;
 - *Hurricane Information Guide for Coastal Residents*, a 17-minute video detailing one family's preparations for a hurricane;
 - Atlantic Hurricane and Pacific Hurricane/Typhoon Tracking Posters; and
 - Coloring books, produced in English and Spanish, covering activities related to earthquakes, floods, tornadoes, and fires.
- The State of Colorado, in conjunction with Federal agencies, volunteer organizations, and private industry, conducted a Wildfire Preparedness and

Awareness Campaign and distributed 50,000 brochures in high-risk areas throughout the State.

- Architects, engineers, and builders involved in mitigation efforts following the 1994 Northridge Earthquake developed full-scale models illustrating structural and nonstructural mitigation measures as a tool for informing local residents about such measures. Information was provided in eight languages.
- The University of Wisconsin-Extension prepared a handbook, *The Disaster Handbook for Extension Agents*, including chapters on floods, fires, tornadoes, severe winterstorms, and drought.
- The Weather Channel produced *Sky on Fire*, a 15-minute video and associated brochure documenting the characteristics of lightning and how to plan for lightning events.

CHAPTER

29

INCENTIVES AND RESOURCES

Before effective hazard mitigation measures can be developed and applied, stable funding sources and effective incentives must be established to encourage participation by the private and public sectors. FEMA's efforts are undertaken through existing FEMA programs, and through partnerships with each State.

PERFORMANCE PARTNERSHIP AGREEMENTS

Initiated in 1995, Performance Partnership Agreements (PPAs) will strengthen Federal-State relationships by setting mutual objectives and allowing States to determine how they will achieve those objectives. Prior to 1995, the financial assistance relationships between FEMA and the States were defined by Combined Cooperative Agreements (CCAs).

PPAs provide the framework to improve capabilities in emergency management and to reduce losses from disasters. The agreements define long-term objectives and the annual financial and technical assistance required to achieve those objectives. Through the PPA, FEMA consolidates programs and funding streams, eliminates micro-management of programs, devolves decision-making through national goal setting and added flexibility for local mitigation strategies, and encourages new funding mechanisms and incentives to reward progress towards those goals.

Accomplishing PPA objectives will help build and enhance State and local abilities to address hazards effectively, and will ensure that Federal, State, and local governments operate together efficiently during a major disaster or other emergency situation. The PPA will focus all participants' efforts to achieve the goals of the partnership.

Initially, FEMA will provide financial assistance to States on an annual basis, coincident with the Federal fiscal year through cooperative agreements that identify negotiated outcomes that contribute to the long-term goals and objectives. FEMA will seek changes to allow for multiyear agreements with multiyear funding, and a period of performance that is consistent with a State's fiscal year.

EXISTING FEMA PROGRAMS (1995)

Programs administered by FEMA under which resources and incentives are provided to State and local emergency management efforts are summarized below.

- **Emergency Management Assistance Program.** FEMA provides partial funding for salaries of State

and local emergency managers, and fully funds population protection planners, radiological defense officers, and facility surveyors.

- **Community Assistance Program.** Funded by the NFIP, cost-shared funds to meet agreed-upon objectives for flood-hazard reduction are provided to States to support technical assistance to communities participating in the NFIP. The goal is to identify, prevent, and resolve floodplain management issues in NFIP communities before a flood occurs, or before poor performance or non-compliance warrant enforcement and intervention by FEMA.
- **Community Rating System (CRS) for Floodprone Communities.** A voluntary program, CRS rewards NFIP communities that exceed the minimum criteria of the NFIP. A primary goal is to encourage, through the use of flood insurance premium adjustments, community and State activities to reduce flood losses by reducing damage to insurable buildings, preventing increases in flood damage to new construction, protecting public health and safety, reducing the risk of erosion damage, and protecting natural and beneficial floodplain functions.
- **Community Volunteer Fire Prevention Program.** FEMA awards grants for local fire prevention and education projects.
- **Emergency Management and Assistance Grants.** Under the Stafford Act (P.L. 93-288), FEMA provides grants to States, with pass through to communities, to improve and update State and local disaster assistance plans and capabilities.
- **Disaster Preparedness Improvement Grants.** FEMA provides grants to States to enhance preparedness activities, including hazard mitigation planning.
- **Federal Disaster Assistance Program.** Encompassing post-disaster assistance, this program is designed to supplement the resources of State and local governments and voluntary relief organizations. The President's declaration of a "major disaster" or an "emergency" authorizes the use of supplemental Federal assistance under the Stafford Act (P.L. 93-288, as amended) and triggers other Federal disaster relief programs as well.
- **Hazard Mitigation Grant Program (HMGP).** FEMA provides grants to States and local jurisdictions to implement long-term hazard mitigation measures following major disaster declarations. To be eligible, projects must permanently reduce losses from natural hazards, comply with environmental

requirements, be identified in the State Hazard Mitigation Plan, and be cost-effective. Examples of projects that can be funded include: property acquisition or structure relocation with conversion of land to public open space; elevation-in-place of flood-prone buildings; flood retrofit or seismic rehabilitation of existing buildings; training for architects, engineers, building officials, and other professionals on implementation of mitigation standards and codes; and initial implementation of vegetation management programs intended to reduce exposure of high-risk structures to wildfire hazards.

- **Hurricane Program Property Protection Mitigation Grants.** FEMA provides funds to hurricane-prone States for implementation of mitigation activities. Projects funded by FEMA Regional Offices include retrofitting of existing structures, evaluation of new building projects for mitigation measures, training of building code enforcement officials, and education and public awareness efforts.
- **Individual and Family Grant Program.** Post-disaster, FEMA provides small grants to individuals and families to meet disaster-related necessary expenses or serious needs when those affected are unable to meet such needs through other programs or by other means. Minimum protective measures such as elevating furnaces or installing sump pumps may be funded.
- **National Earthquake Technical Assistance Contracts.** FEMA supports the needs of the National Earthquake Hazard Reduction Program (NEHRP) through this program. Activities include economic impact analyses of earthquakes, exposure assessments for schools and hospitals, and development and training on nonstructural mitigation measures.
- **Public Assistance Program.** FEMA provides assistance to State and local governments following major disaster declarations. Assistance may fund a variety of actions, including: debris clearance; emergency protective measures; and repair and replacement of infrastructure, structural water control facilities, public facilities and buildings, recreational facilities, and eligible educational and health-care facilities. Eligible applicants or subgrantees for assistance are the States, political subdivisions of the States, Indian tribes or authorized tribal organizations, Alaska Native villages or organizations, and qualifying private non-profit institutions within designated disaster areas. In approving projects under this program, mitigation solutions are sought and encouraged.

- **State Earthquake Hazard Reduction Program.** FEMA provides funds to States for the development of comprehensive risk reduction programs at the State and local levels. The program funds technical assistance by States to local governments in the areas of structural and nonstructural mitigation, building codes, and land-use planning ordinances. States are expected to advocate earthquake risk reduction and to encourage the placement of earthquake mitigation on public and political agendas.
- **State Hurricane Program.** FEMA provides financial and technical assistance to State and local governments in support of efforts to plan for and to mitigate hurricane damage.
- **Flood Mitigation Assistance Program.** Authorized by the National Flood Insurance Reform Act of 1994, FMAP grants will assist State and local governments by cost-sharing in cost-effective projects to reduce or eliminate long-term risk of flood damage to buildings and other insurable structures. FMAP provides both planning and project grants, and eligible projects include acquisition, relocation, elevation, and minor structural projects. In order to receive a grant, communities or States must have a FEMA-approved Flood Mitigation Plan that identifies a comprehensive strategy for mitigation in affected areas.
- **Increased Cost of Compliance Under the NFIP.** Included in flood insurance policies issued by the NFIP, increased cost of compliance coverage is intended to cover the cost of compliance with land use and control measures that are part of the NFIP. Insured properties that sustain substantial damage or repetitive flood damage will be eligible for additional claim payments to assist with paying the cost of complying with local floodplain management ordinances.

RECENT ACTIVITIES SUPPORTED BY FEMA FUNDING (1995)

The largest mitigation project to date is the buyout of properties in the Midwest after the Great Flood of 1993. Using funds from the Hazard Mitigation Grant Program combined with funds from other Federal, State, local, and private sources, approximately 9,000 structures have been or are expected to be purchased in more than 200 communities. Structures are bought and removed, and the land is retained permanently in public ownership as open space or for compatible uses such as parkland.

Examples of other recent mitigation activities funded by FEMA, in whole or in part, under the programs discussed above are summarized below.

- The State of California offers seminars to encourage local government and industry leaders to adopt and enforce codes to deal with urban-wildland fire problems. The seminars address wildland fuels and fire behavior; fuels management; defensible space; fire-fighting infrastructure; slope stabilization; codes, standards, and regulations; and coordinated planning, code adoption, and enforcement.
 - The final portion of the "inland wind decay model" is being developed and hurricane evacuation studies will be digitized using funds provided by the National Hurricane Program.
 - FEMA developed and continues to maintain the NEHRP Recommended Provisions, in conjunction with the Building Seismic Safety Council. The provision are a resource that is widely used by practicing design professionals and building officials. They have been used in revising the seismic requirements of all three major model building codes.
 - The University of Nevada at Reno is constructing two 14-foot by 14-foot movable "shake tables" to conduct earthquake research. The tables will simulate the force of an earthquake measuring 7.5 on the Richter scale.
 - The Vermont Emergency Management Agency, FEMA, USACE, and local officials developed an ice-jam mitigation project on the Lamoille River in Hardwick, VT.
 - As part of Project Blue Sky, a public building in Charleston, SC, will be retrofit to improve resistance to hurricane and tropical storm hazards and will be used for demonstration purposes.
 - The State of New Jersey and the Rutgers University Institute of Marine and Coastal Sciences are developing a process to assist communities in applying risk reduction strategies within the framework of shoreline management. The project will include the design, creation, and testing of a beach-dune template for several storm scenarios.
 - The State of Illinois teamed with FEMA Regional Office staff to develop and present a prototype local mitigation plan to be used by communities in the State. As a result, several communities have adopted mitigation plans.
 - A statewide integrated storm warning system that uses a network of stream gages, precipitation gages, weather radar, and computer models to predict impending flooding and severe conditions is being developed in Ohio.
 - Floodproofing projects were completed for public facilities in Breckenridge, MN, including the lift station, water treatment plant, and electric substation.
 - Because of flood damage from the fall 1994 floods in southeastern Texas, 577 residential structures are being acquired and removed from the floodway at a cost of more than \$19 million.
 - As a result of flood damage from the 1993 disaster, 35 mitigation projects totaling more than \$35 million were undertaken in North Dakota and South Dakota.
 - Twenty statewide grants, totaling approximately \$55 million, will be made available to qualified applicants in California, where the 1995 flooding produced major flood and landslide damage in all 58 counties.
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CHAPTER

30

LEADERSHIP AND COORDINATION

The Federal Government, and FEMA in particular, must support and encourage mitigation activities at the State and local levels by providing leadership and coordination. FEMA has focused on supporting and encouraging hazard identification, risk assessment, and mitigation activities at the State and local levels. FEMA also must lead by example, by adopting and practicing the best mitigation techniques for all actions affecting its facilities and employees. FEMA must continue to lead coordination activities by initiating and forming partnerships with Federal, State, and local agencies and with private sector organizations.

In addition to numerous partnerships, FEMA staff participate in several interagency task forces, including the Federal Interagency Floodplain Management Task Force, Federal Interagency Mitigation Task Force, and the Interagency Committee on Seismic Safety in Construction.

EXISTING FEDERAL PROGRAMS

(1995)

The programs under which FEMA has and will continue to provide leadership and coordination are summarized below.

- **Chemical Stockpile Emergency Preparedness Program (CSEPP).** Under CSEPP, FEMA assists State and local jurisdictions to prepare for incidents related to the storage and destruction of the U.S. Army's chemical weapons stockpile. Based on a Memorandum of Understanding with the U.S. Army, FEMA provides technical assistance with comprehensive planning, exercises, training, and public information for the States and local jurisdictions surrounding eight stockpile sites.
- **Civil Defense Program.** FEMA works with State and local agencies to provide the basic elements (personnel, hardware, facilities, communications) for an integrated, all-hazard emergency management capability. During natural disasters, FEMA operates the National Warning System and the Emergency Broadcast System.
- **Empowerment Zone/Enterprise Community (EZ/EC) Program.** FEMA launched an initiative with the U.S. Departments of Agriculture and Housing and Urban Development to include mitigation considerations in the EZ/EC program. Communities are encouraged to perform a comprehensive analysis of the natural hazards which is used to incorporate mitigation techniques into development and redevelopment strategies.

- **Hazard Mitigation Technical Assistance Program Contract (HMTAP).** HMTAP was established to provide FEMA with response capability for various post-disaster mitigation opportunities. The contractor has the capability to: (1) evaluate construction science techniques and practices, including build codes; (2) prepare environmental assessments or impact statements and historic preservation reviews and assessments; (3) conduct biological assessments and surveys; (4) conduct surveys, assessments, and reviews of other areas of impact such as water quality and wetland delineation; (5) conduct benefit/cost, social science, and public administration assessments; (6) conduct post-event assessments to identify mitigation opportunities; (7) provide post-disaster land surveying, mapping services and cost estimates using GIS, GPS, and remote sensing; (8) perform floodplain analyses; (9) conduct hazard identification and risk assessment to confirm accuracy and specific actions or methodologies needed for disaster areas; (10) document estimated flood elevations to guide reconstruction and to compute flood frequency; and (11) provide training for benefit/cost analysis, retrofit options, the Hazard Mitigation Grant Program, and National Environmental Policy Act.

- **Hazard Mitigation Grant Program (HMGP).** Under HMGP, FEMA helps States and local jurisdictions to implement long-term hazard mitigation measures following major disaster declarations. Examples of projects that are supported include: property acquisition or structure relocation and conversion of vacated land to public open space; elevation-in-place of floodprone buildings; flood retrofit or seismic rehabilitation of existing buildings; training for architects, engineers, building officials, and others on implementation of State or local mitigation standards and codes; and initial implementation of vegetation management programs intended to reduce susceptibility of high-risk buildings to wildfire hazards.

- **Hazardous Materials Program.** FEMA's mission under this program is to provide technical and financial assistance to States and local jurisdictions and to coordinate with public and private sector entities to develop, implement, and evaluate HAZMAT emergency preparedness programs. FEMA supports State and local agencies in the design, implementation, and evaluation of HAZMAT-related training and planning exercises, and cooperates with the U.S. Department of Transportation in the maintenance of electronic bulletin boards to provide the latest information on HAZMAT planning, training, exercises, and conferences.

- **National Earthquake Hazard Reduction Program (NEHRP).** Under NEHRP, FEMA leads efforts, in cooperation with the US Geological Survey, National Institute for Standards and Technology, and the National Science Foundation, to carry out fundamental and applied research, and technology and information dissemination. The primary activities include: development of improved seismic design and construction practices for adoption by Federal agencies, State and local governments, and the private sector; provision of financial and technical assistance to State and local governments for implementation of comprehensive earthquake hazard reduction programs; development of public education and awareness programs; and planning for and coordination of adequate Federal capability to respond to seismic disasters.

Under FEMA's leadership, NEHRP agencies work with end users to identify research gaps and to promote the transfer of knowledge. A variety of vehicles are used, including the National Earthquake Information Service for Earthquake Engineering at the California Institute of Technology and University of California at Berkeley; National Earthquake Information Center in Golden, CO; National Hazards Information Center in Boulder, CO; Information Service of the National Center for Earthquake Engineering Research in Buffalo, NY; and the Earthquake Hazards Reduction Publications series.

- **National Earthquake Technical Assistance Program.** FEMA provides technical assistance, support, and expertise to State and local agencies in the evaluation of earthquake hazards and implementation of projects to reduce vulnerability to earthquakes.
- **National Flood Insurance Program (NFIP).** As part of the NFIP, FEMA works with States and communities to identify special flood hazard areas and to assess risks associated with certain magnitudes of flooding. Flood hazards are depicted, on a community or county-wide basis, on Flood Insurance Rate Maps. FEMA works with States and communities to implement floodplain management regulations that are designed to prevent new development from increasing flood hazards and to protect new and existing buildings from anticipated floods. More than 18,000 communities participate in the NFIP.
- **National Hurricane Program.** Under this program, FEMA coordinates ongoing hurricane-related planning and mitigation activities of the U.S. Army Corps of Engineers, the National Hurricane Center, the National Weather Service, and NOAA's Office of Ocean and Coastal Resource Management.

- **Radiological Emergency Preparedness Program (REPP).** FEMA's mission under REPP is to enhance integrated emergency planning and response for all types of radiological emergencies. The primary emphasis is on planning and preparedness for commercial and nuclear powerplants, nuclear fuel cycle and material license holders, transportation accidents, and incidents at the facilities of the U.S. Departments of Defense.
- **U.S. Fire Administration (USFA).** Through the USFA, FEMA administers a nationwide program to enhance fire prevention and control activities and to reduce significantly the loss of life and property caused by fires. Programs are carried out by: National Fire Academy; Office of Fire Prevention and Arson Control; Office of Firefighter Health and Safety; Office of Fire Data and Analysis; Office of Federal Fire Policy and Coordination; Office of National Emergency Training Center Operations and Support, and Office of Educational Technology.

TASK FORCE AND COMMITTEE PARTICIPATION (1995)

FEMA participates in several interagency task forces, including those summarized below.

- **Federal Interagency Floodplain Management Task Force.** This Task Force, chaired by FEMA and comprising 10 Federal agencies, was formed in 1975 to prepare reports for the President to transmit to the U.S. Congress. The Task Force produced *A Unified National Program for Floodplain Management*, which provides a conceptual framework for floodplain management nationwide and the 1994 update report identified goals and objectives for the next 25 years.
- **Federal Interagency Mitigation Task Force.** Recognizing that the successful implementation of the National Mitigation Strategy will require the cooperation of all Federal agencies, FEMA led the formation of this Task Force. Members include all Federal agencies with programs that support or encourage mitigation actions at the State and local levels. The ultimate goal of the Task Force is to develop a Federal Mitigation Plan to encourage partnerships for pre- and post-disaster hazard mitigation actions between Federal agencies and with State, local, and private sector partners.

One of the most significant early Task Force recommendations is the establishment of a National Multi-Hazard Mitigation Council which would: identify,

develop, and propose a coordinated agenda; identify appropriate sources of funding for ongoing public and private risk mitigation efforts; and define and recommend specific task-oriented projects.

- **Interagency Committee on Seismic Safety in Construction (ICSSC).** FEMA has had significant involvement with the ICSSC in the preparation of the Inventory of Federal Buildings, which provides guidance to Federal agencies to conduct building inventories and to estimate the cost of seismic rehabilitations.

RECENT LEADERSHIP AND COORDINATION ACTIVITIES (1995)

Selected activities in which FEMA staff from Headquarters and Regional Offices have participated are described below.

- In May 1995, FEMA conducted an exercise "RESPONSE 95," which involved simulation of a Category 4 hurricane in the Gulf of Mexico. The exercise involved more than 3,000 participants from 27 Federal departments and agencies, two U.S. Army areas, Mississippi, Alabama, private relief organizations, and several private companies.
 - FEMA continues to work with and fund the activities of three multi-state groups to facilitate information exchange and technology transfer concerning seismic hazards and the reduction of risk from those hazards. The groups are the Central United States Earthquake Consortium, the New England States Earthquake Consortium, and the Western States Seismic Policy Council.
 - FEMA continues to work closely with the Earthquake Engineering Research Institute, the Southern California Earthquake Center, and the National Center for Earthquake Engineering Research to conduct conferences, workshops, and earthquake-related studies.
 - FEMA worked with the Rhode Island Emergency Management Agency and the University of Rhode Island Coastal Resources Center to develop a coordinated State and local hazard mitigation strategy that links State and local agencies early in the planning process.
 - FEMA Regional Office staff participates in the Hazard Mitigation Policy Committee chartered by the New York State Office of Emergency Management.
 - FEMA Regional Office staff work with USEPA, HUD, and State agencies to develop and implement the "Gateway Plan" in an effort to increase urban open space and greenbelts in East St. Louis, MO.
 - FEMA Regional Office staff assisted in the development of a manual, *Flood Hazard Mitigation in Northern Illinois*, intended as guidance for the development of local hazard mitigation plans.
 - FEMA Regional Office staff worked with the Texas Floodplain Management Association and the Building Officials Association of Texas to develop an innovative approach for assessing flood-caused damage quickly and consistently.
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